

# OPERATING MANUAL CHANGES

## MANUAL IDENTIFICATION

**Model Number:** 64100A/64110A

**Manual Title:** Installation & Configuration Ref. Manual

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This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections.

Make all appropriate software or hardware related changes indicated in the table below.

Software		Hardware	Make Manual Changes
Model - Rev.	Date	Serial Prefix or Number	
System Software Update	1 Nov '83		

### CHANGE 1

Table of Contents,

Replace with new Table of Contents, attached.

Chapter 3,

Add pages 3-12.1 through 3-12.40.

### NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

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## Disc Utilities

### General

Disc Utilities includes software designed to test and format a 64000 system hard disc. The tests are divided into three groups: the first group of tests exercises the Disc Models 7908P, 7911P, and 7912P (CS/80), the second group of tests exercises the Disc Models 7906M, 7920M, and 7925M (MAC discs), the third group of discs, Models 9436A/B and 9436XV are exercised by the MAC disc tests.

You will want to use the Disc Utilities when you are initializing and formatting a new disc, when you want to reformat a disc, or when data transmission errors indicate a possible disc malfunction. The test descriptions are included to help you decide whether you need to call service personnel and to give you diagnostic information to pass on to them.

Some of the tests include writes to the disc which will destroy any data stored on it. Always copy all data that is on the disc to another storage media before formatting or destructive testing.

The utilities are divided into two groups: CS/80 Discs and Mac Discs. The documentation for each group includes a description of the test procedure, a description of the softkeys used in each test, and the test descriptions.

Table 3-3 provides a cross-reference of disc model number to disc utility.

Table 3-3

DISC	<test>	<format>	<fmt&tst>	<soft fix>	<hard fix>
7906	MAC	MAC	MAC	MAC	MAC
7920/25	MAC	MAC	MAC	MAC	MAC
7908/11/12/14	NA	CS/80	CS/80	CS/80	CS/80
7910	MAC	MAC	MAC	MAC	MAC
9134A/B	MAC	MAC	NA	MAC	NA
9134XV	MAC	MAC	MAC	MAC	NA

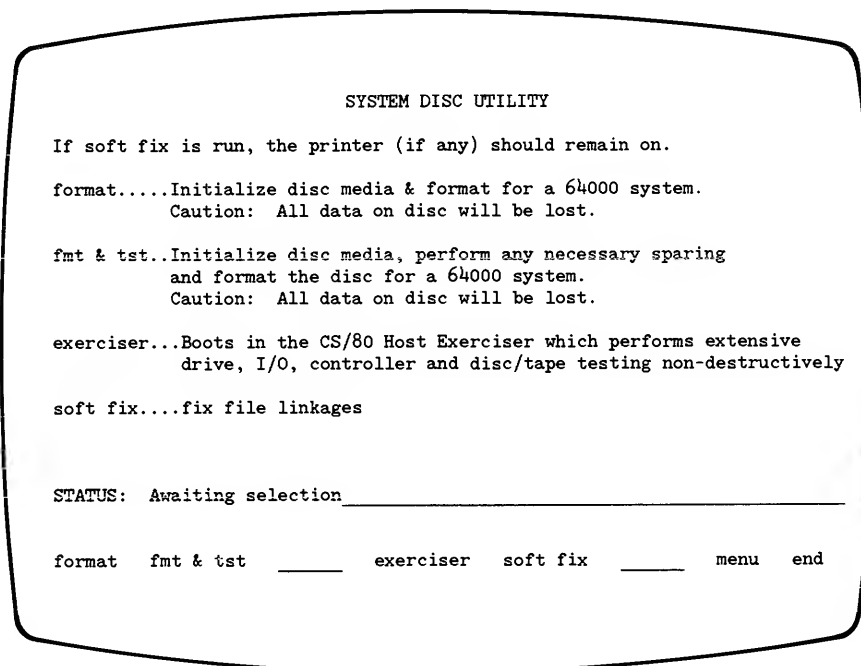
Table 3-4 defines several disc related terms which are used in this chapter.

**Table 3-4. Disc Utilities Terms**

CS/80	Command Set 80 discs refer to a group of Winchester discs, Model numbers 7908P,7911P,7912P and 7214P.
ERT	error rate tests are tools used to establish media integrity within a disc. Error rate tests may be read-only or write-then-read. Data collected during error rate testing is accumulated in an error rate log.
format	format indicates that the disc media is initialized to 64000 system specifications. The format routines described in this manual go beyond media initialization to include preparation of directory area, operating system area, and free list area. This is a destructive procedure.
initialization	media initialization involves setting up parameters such as disc sector format, sector interleaving, sparing technique, and tape block format. This is a destructive procedure.
MAC	Multi-Access Controller defines a group of discs which may share a controller, Model numbers 7906M,7920M, and 7925M.
spares	extra sections of disc media (often sectors) set aside to be used to replace sections found to be defective. The free list directory then links in the spare sections and excludes the defective sections.

## CS/80 Discs

If your system disc is a Model 7908P, 7911P, 7912P, or 7914P the development station CRT will display the following screen when Operating System floppy 1 of 3 is loaded (booted). (If your disc does not respond when the system is booted, the operating system will default to the Host Exerciser software and an alternate screen will be displayed. Refer to the Host Exerciser description if this happens.)



### CS/80 System Disc Utility



Format **<format>**

This routine initializes the disc for use in the 64000 system. Format performs the quickest 64000 system initialization; however, because no testing is performed, its ability to detect marginal areas of the disc is limited. Whenever the reliability of the media is in question the Format and Test **<fmt&tst>** should be run.

CAUTION

Formatting or initializing destroys all information stored in disc memory. Back up all user files before continuing.

When you select **<format>** the system may execute a series of displays that require input of bus address numbers and unit numbers. When more than one disc controller is on the bus, the system requests entry of the address of the disc to be initialized.

After the initial questions, if any, are answered, the screen presents **<yes>** and **<no>** softkeys and the question:

**DO YOU WANT TO FORMAT?**

**<no>**

If you select **<no>** the display will return to the Disc Initialization screen. At this point no data has been lost. Press **<menu>** to return to the Disc Initialization Menu Display.

**<yes>**

If you select **<yes>**, the format will begin. The first command issued is the Initialize Media command with the option to retain all factory and field spares. During this time the status line will read:

**"Formatting tracks"**

This command is executed without host interaction; no report of its progress can be given.

After the Initialize Media Command is complete, the directory area, operating system area, and free list area will be prepared.

While the Directory area is being prepared, the status line will read:

**"Writing directory"**

Next the Operating System area is prepared. The free list area is the last to be prepared. During this time the status line will read:

**"Building free list"**

As each 64000 page is examined, the page number is displayed in the upper right corner of the screen. Tracks found to be defective during the format can not be subsequently used by the system. The following messages appear, one after the other, on the message line:

**Writing Directory**

**Building Free List**

When **<format>** is used, the free list contains a listing of all tracks that are not found to be defective. After the free list is built, the disc is completely initialized and the softkeys offer the Disc Initialization menu.

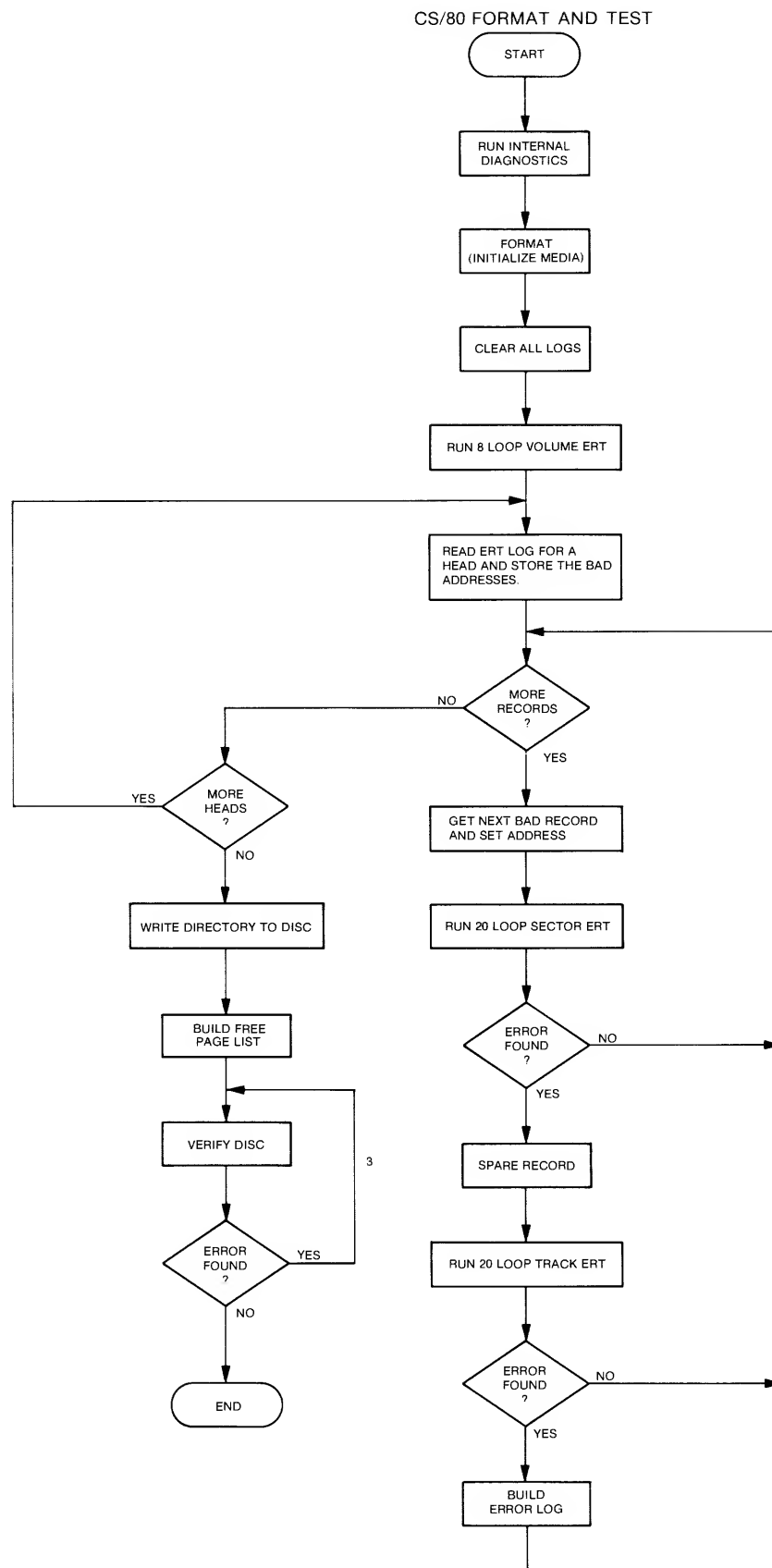


Figure 3-5. Format and Test Flowchart

## Format and Test **<fmt&tst>**

Refer to figure 3-5 for a flowchart illustrating Format and Test. When you press **<fmt&tst>**, the disc is initialized, tested, formatted, and the free list and directory are written. The free list contains a list of all tracks except those found to be defective. Because **<fmt&tst>** builds a more reliable and complete free list, this mode of initializing a disc is recommended over use of the separate **<format>** when disc media is suspect.

Before **<fmt&tst>** begins, the operating system executes a series of displays that require input of bus address numbers. When more than one disc controller is on the bus, the system requests entry of the address of the disc controller to be tested.

After the initial questions are answered, the screen presents **<yes>** and **<no>** softkeys and the question:

**Do You Want To Format?**

**<no>**

When you select **<no>**, the display returns to the Disc Initialization softkeys; no data has been lost. Press **<menu>** to return to the Disc Initialization Menu Display.

**<yes>**

When you select **<yes>**, **<fmt&tst>** begins by executing a diagnostic routine, Diagnostic 0.

The next command issued is initialize media (format). During this time the status line message reads:

**Formatting tracks**

Next all error logs are cleared and an eight-loop full volume write-then-read ERT is performed. The status line message reads:

**Testing disc**

For Each Head

The ERT log is read for each head and the bad addresses are stored. Each bad record is accessed one by one, the address is set and a 20-loop sector ERT is run. If an error is found the record is spared and a 20-loop track ERT is run. If the track is found to be in error an errorlog is built to be referenced when the free list is built; the next record is accessed and the process is repeated.

When all heads have been tested the directory will be prepared; the status line will read:

**Writing directory**

Next the Operating System area is prepared. The Free list area is the last to be prepared. During this time the status line will read:

**Building free list**

After the free list is built the disc will be verified; during this process the status message will read:

**Verifying disc**

If the disc cannot be verified the status line message will read:

**Corrupt media, format aborted. See your service engineer.**

## Host Exerciser **<exerciser>**

Refer to figure 3-6 for a flowchart illustrating the Host Exerciser. The CS/80 Host Exerciser is an interpreter which links a 64000 system user to a set of diagnostics and utilities within the HP7908/11/12/14. The Exerciser will help you decide when you need to call for service help and it will give you diagnostic information to relay to service personnel.

The Host Exerciser allows you to test all of the devices listed on the Host Exerciser Device Map, read a variety of logs and tables, and copy logs and tables to a printer. In addition, you can modify the device map.

It is most meaningful to immediately test the devices listed on the Device Map. The information available via the **<read>** softkey should not be considered reliable until **<test>** has been run. Then if a test has failed, the information in the tables and logs can be used to diagnose the failure.

The Host Exerciser documentation will be divided into three parts: first, the test procedure; second, a description of the test flowchart; and finally, brief explanations of the tables and logs (Table 3-6).

### Procedure

Press **<exerciser>**.

**Boot in Progress** When you select **<exerciser>** the screen will blank; then, will display **BOOT IN PROGRESS**. Most of the disc utilities software can function in a minimal operating system; the Exerciser software, however, needs to exercise the disc in an environment that approximates typical system operation. For this reason, memory space is allocated to the Exerciser as if it were an emulator or analyzer. The **BOOT IN PROGRESS** message will be displayed whenever the Exerciser is entered or exited.

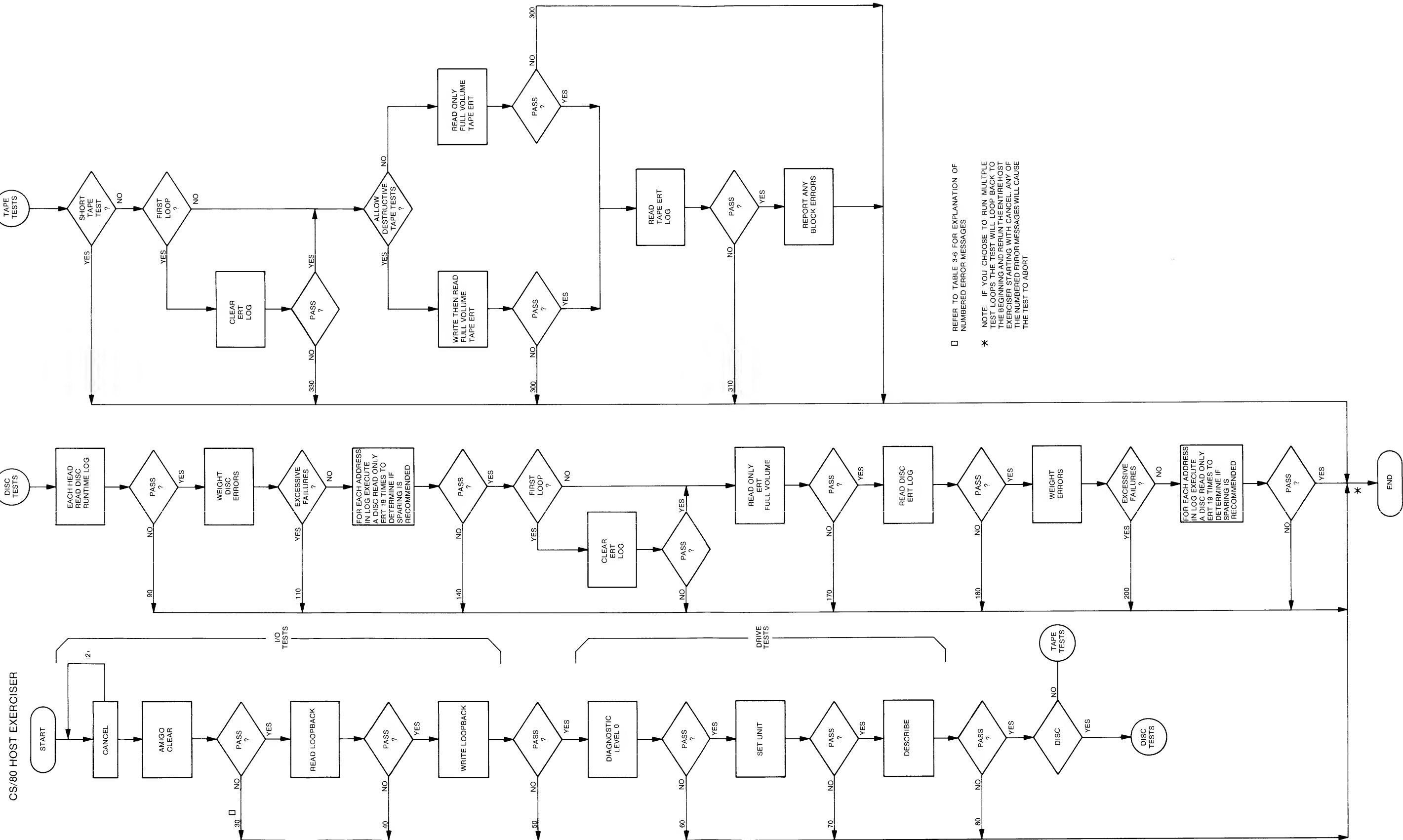


Figure 3-6.  
CS/80 Host Exerciser Flowchart  
3-12.10

Device No.	Device Name	Device Type	HPIB Address	Unit Number
1	7908	Disc	0	0
Device Map (use help for assistance)				CS/80 Host Exerciser
Device No.	Device Name	Device Type	HPIB Address	Unit Number
1	7908	Disc	0	0
2	7908	Tape	0	1
*****Printer available				

Device Map--CS/80 Host Exerciser

When the display comes up it will be identified as the CS/80 Host Exerciser, and it will display a Device Map and the basic softkeys for the Host Exerciser. The Device Map will identify each device which the development station sees on the bus by name (HP part number), type (disc or tape), HP-IB address, and unit number (to reference more than one device at an HP-IB address). Additionally, each device has been assigned a device number which will be used in the test and table/log selection.

NOTE

All DC600 tape drives installed with 7911/12/14 Discs will be listed on the Device Map as Device Name "7908" and Device Type "Tape"



To Test Discs. If only one device is suspect:

Press **<test>** **<device\_no>** suspect device number.

Press **[RETURN]** to put the device through only one test loop. For multiple loops press **<looping>** then press a number corresponding to the number of test loops required.

NOTE

**<short>** and **<destructive>** apply only to tape tests. If they are selected for a disc test, they will be displayed on the command line, but they will not be executed.

When the exerciser has attempted all of the tests the softkey selections will return to the initial Exerciser level, the display will be headed "Test results", and the status line will read "Awaiting command". The number of tests "completed" is the number which have passed.

NOTE

Double-reset to stop looping.

To Test Tapes. If only one device is suspect:

Press **<test>** **<device\_no>** suspect device number.

Three tape test routines are provided:

**<short>** exercises only tape drive level hardware. Can be run without a tape in the tape drive.

**<destructive>** this is a read-write test. It will destroy any data recorded on the tape.

default this choice is not listed as a softkey; it is chosen if neither **<short>** nor **<destructive>** are selected. This is a non-destructive read only test, but, since it updates logs and tables, the tape must be write enabled.

Press **[RETURN]** to put the device through only one test loop. For multiple loops press **<looping>** then press a number corresponding to the number of test loops required.

When the exerciser has attempted all of the tests the softkey selections will return to the initial Exerciser level, the display will be headed "Test results", and the status line will read "Awaiting command". The number of tests "completed" is the number which have passed.

#### NOTE

Double-reset to stop looping.

To Test All Devices.

Press **<test>** **<all\_dev>**

Three tape test routines are provided:

(These softkeys apply only to tape tests)

**<short>** exercises only drive level hardware. Can be run without a tape in the tape drive.

**<destructive>** this is a read/write test. It will destroy any data recorded on the tape.

default this choice is not listed as a softkey; it is chosen if neither **<short>** nor **<destructive>** are selected. This is a non-destructive read only test, but, since it updates logs and tables, the tape must be write enabled.

Press **[RETURN]** to put the device through only one test loop. For multiple loops press **<looping>** then press a number corresponding to the number of test loops required.

When the exerciser has attempted all of the tests the softkey selections will return to the initial Exerciser level, the display will be headed "Test results", and the status line will read "Awaiting command". The number of tests "completed" is the number which have passed.

#### NOTE

Double-reset to stop looping.

### CS/80 Host Exerciser Softkeys

(each of these softkey selections includes its own subset of softkeys)

test	this softkey selects device testing. Tests include device I/O channel testing, drive diagnostics, Error Rate Testing, and specific tests for disc and tape drives. The disc tests are non-destructive; one of the tape tests is destructive.
read	provides the ability to read a variety of logs and tables from a device.
print	copies logs and tables for a specific device to a printer.
listfile	sets the listfile output for all commands.

(The following softkeys allow you to display and modify the current device map.)

disp_dev	displays the current device map.
reset	resets the device map by identifying all devices on the system bus.
add_dev	allows a user to add a device to the device map. This is helpful if a device will not respond to an identify sequence.
delete	allows a user to delete a device from the device map.

### Help Display

test	This softkey selects device testing. Tests include device I/O channel testing, drive diagnostics, Error Rate Testing, and specific tests for disc and tape drives.
all_dev	this softkey initiates testing of all units assigned device numbers which are listed in the device map display.
dev_no	this softkey initiates testing of one unit assigned a device number which is listed in the device map display.
<NUMBER>	this softkey is a prompt for a device number to be entered.
looping	causes the test to be repeated for a defined number of times.
<COUNT>	a prompt for the number of loops to be repeated.
short	this selection applies only to the tape tests. It initiates read-only testing of the tape.
destruct	this selection applies only to the tape tests. It initiates a read and write test on the tape which will destroy all previously recorded data.
listfile	sets the listfile output to display or to a printer.

**Test Descriptions.** The Host Exerciser tests will be briefly described in the following paragraphs. Host Exerciser error messages are described in Table 3-5.

#### Clearing the Disc Hardware

**Cancel--**This command will appear briefly on the status line. It indicates that the disc is being notified that it should cancel any current operations and enter a reporting phase.

**Amigo clear--**The next status message will be "Amigo clear" which indicates that a more complete clearing of the disc hardware is occurring.

#### Exercise I/O circuitry

**Channel loopback read/write--**In these tests the 64000 Host Processor first reads a pattern which is stored in Disc Controller ROM; next, the Host Processor writes the same pattern to the Disc Controller and receives an acknowledgment that the pattern was correctly received.

**Drive Test--** Three tests are performed on the disc drive: a diagnostic test, a set unit test, and a describe command. The diagnostic test invokes tests which reside in drive firmware. A list of the particular diagnostics a device will respond to can be found in the service manual for the device. If any error is found during a diagnostic, a status message is sent along with parameters indicating which unit failed and the type of error. A diagnostic test will terminate when the first error is incurred and the maximum possible isolation of that error has taken place.

**Set Unit--**This test requires that the drive be able to address and recognize each disc and tape unit for which it is responsible.

**Describe** instructs the drive to return a description of itself including HP part number and various parameters.

Disc or Tape?

Next the test software branches into Disc Tests or Tape Tests.

#### Disc

The disc tests are nondestructive read-only tests. The Host Exerciser reads the Disc Run Log then weights the disc errors to determine if the failures are excessive. If the number of failures are excessive the test will end; the source of the failures in this case would probably not be disc media. If the number of failures is not excessive the ERT log will be cleared and a full volume read-only ERT will be run. The ERT log will be read and the errors weighted. Once again if the number of failures are excessive the test will end; the source of errors would probably not be disc media. If the number of failures are not excessive one disc test loop will have been completed. When you select multiple loop testing the ERT log is cleared only for the first loop.

## Tape

Three modes of tape tests are available. The first mode, <short tape test>, tests only the tape drive electronics and may be run without any cartridge in the drive. If the short mode is not chosen, the ERT log is cleared (if multiple loops this occurs during the first loop only) then the test branches into either the second mode or the third mode. The second mode is a destructive write-then-read full volume ERT. The third mode is the default mode which is a read-only full volume ERT. The final steps of either long test mode are to read the ERT log and report any block errors.

## Multiple Test Loops

If you choose to run multiple test loops, the test will loop back to the beginning of the I/O tests and rerun the entire Host Exerciser starting with Cancel.

Errors will abort testing even when you select looping.

Double-reset to stop looping.

Table 3-5. Host Exerciser Error Messages

Illegal Device Number (See device map)

Unit number is out of range (must be 0 thru 14)

HP-IB address is out of range (must be 0 thru 7)

Device Map is full - delete an entry first

Tape command issued to a disc unit - see device map

Disc command issued to a tape unit - see device map

Power fail status on device - requesting status

ERROR: The drive is not responding to the system. Corrective action: check to see that it is connected & online. (Device does not respond at all)

STATUS: The device received an unrecognized command. (Illegal command for a device)

>If the error persists please call your service representative. (Call service)

ERROR: The drive is experiencing channel (interface) problems. (The drive responds but with data errors.)

ERROR: A cartridge tape is not installed. Corrective action: Install a cartridge tape and re-run the command. (Attempted access to a DC600 cartridge tape which is not installed.)

ERROR: The tape media appears to be uninitialized. Corrective action: Please initialize it and re-run the command. (DC600 Cartridge tape is not initialized and can not be accessed.)

ERROR: The cartridge tape installed is write protected. Corrective action: Please write enable the cartridge. (User has requested activity which requires the tape to be write-enabled. I.E. system needs to update a log or destructive tape tests were enabled.)



Table 3-5. (Cont'd)

20: Cancel Unit  
30: Amigo Clear  
40: Read Loopback  
50: Write Loopback  
60: Diagnostic <internal self test>  
70: Set Unit  
80: Describe - <Generic Dev= X    Number Heads= Y  
90: Read Disc ERT Log  
110: Transient Error Threshold <Head No.= Y>  
140: Read Only - Error Rate Test <x19>  
160: Clear Error Rate Test Log  
170: Read Only - Disc Error Rate Test  
180: Read Disc ERT Log  
200: Transient Error Threshold <Head No. = Y>  
300: Read Only - Tape Error Rate Test  
300: Write/Read Tape ERT  
310: Read Tape ERT Log  
330: Clear Error Rate Test Log  
400: Sparing Recommended <Cylinder= X    Head= Y    Sector= Z>

Table 3-6. Reading Logs and Tables

When you press **<read>** the following softkeys will come up.

disc

describe        displays a table which describes the characteristics of a selected device.

req\_stat        this softkey allows the CS/80 device to send back a status message to the CS/80 external exerciser. The status message consists of an identification field and an error reporting field. The identification field shows the unit and volume currently addressed and identifies any other units requiring service. The error field shows four types of errors: reject errors, fault errors, access errors, and information errors.

run\_log        this softkey allows the user to access the run log which contains an accumulation of the run-time data which the device has logged. Run time data are accumulated and logged by the disc automatically during normal data operations. The run-time data are accumulated and cataloged by head number.

ERT\_log        this softkey allows the user to access the error rate log which contains an accumulation of all read errors which were found on the disc during a read only or write-then-read error rate test. Since the error correction circuitry (ECC is disabled during an error rate test, the error rate test log will accumulate both uncorrectable and correctable errors. Each data head has its own error rate log for that surface. Error rate test errors are accumulated and cataloged by head number.

fault\_log       this softkey allows the user to access the fault log which contains an accumulation of the faults which occurred on that particular device over a period of time since the last time the logs were cleared.

spare\_table    this softkey accesses the tables stored in memory which contain a list of all logical tracks which have been spared for each head.

error\_summary   returns a 64 byte error summary of the results of all tests executed.

rev\_table       contains listing of firmware revisions which apply to ROM loaded in devices under test.

For 7908 discs:

head\_adaptation\_table       contains various seek parameters.

Table 3-6. (Cont'd)

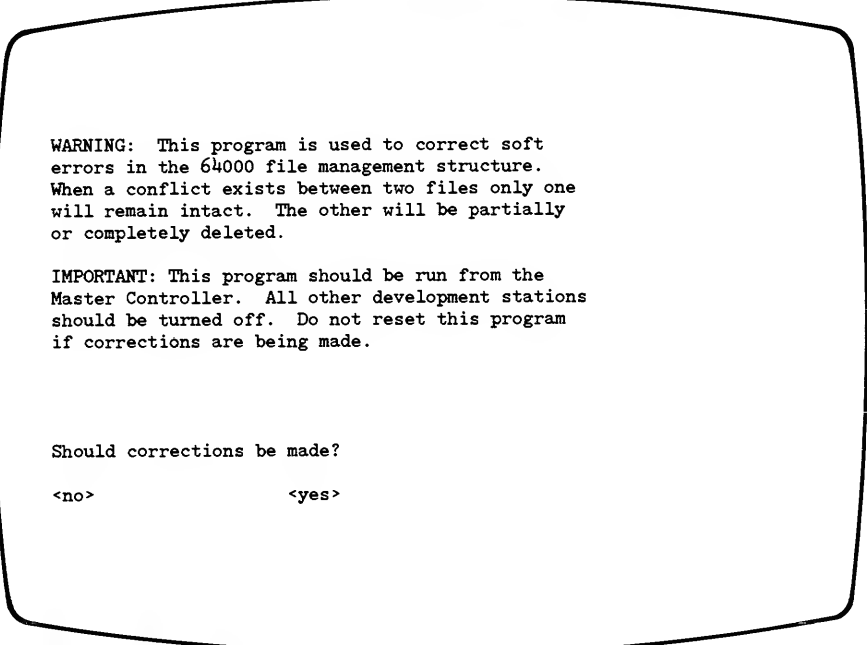
tape

run_log	this softkey displays the run log which contains an accumulation of the run-time data errors which the tape has logged. Run time data errors are accumulated and logged by the tape automatically during normal data operations.
ERT_log	this softkey displays the error rate log which contains an accumulation of all read errors which were found during a read only or write-then-read error rate test. Since the error correction circuitry (ECC) is disabled during an error rate test, the error rate test log will accumulate both uncorrectable and correctable errors. The tape cartridge has one error rate test log area for the entire tape.
mfg	this softkey displays information on the tape manufacturer.
use_log	the use log provides the tape cartridge use count (number of times the tape has been inserted) and the number of blocks which have been accessed on the particular cartridge.
spare_table	this softkey displays the physical addresses of the blocks which have been spared.
addr	used by Model 7914, this display contains a six byte disc block address where a "copy data from this disc" command will begin.

Soft Fix **<soft\_fix>**

The soft fix routine repairs incorrect file linkages. It should be used when errors such as "disc full" occur when the disc is not full. Press **<soft\_fix>** softkey.

Select a disc # to be examined, and press **[RETURN]**. The following message will be displayed:



WARNING: This program is used to correct soft errors in the 64000 file management structure. When a conflict exists between two files only one will remain intact. The other will be partially or completely deleted.

IMPORTANT: This program should be run from the Master Controller. All other development stations should be turned off. Do not reset this program if corrections are being made.

Should corrections be made?

**<no>**

**<yes>**

**<no>**

When you select **<no>**, the errors are listed, and no corrections are made. In this case the **<abort>** softkey allows exit. The status line will read:

**Checking active files, directory sector xxxx**

Next the display will read:

**CHECKING FREE LIST**

**<yes>**

When you select **<yes>**, the errors are corrected. The **<abort>** softkey is not available, and the program must not be halted under any circumstances.

When the printer is on during the soft fix routines, a list of errors is printed out. Active files, recoverable files, and finally free pages are checked. These three categories appear in the listing.

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Along with the file name and error, the file type is indicated by a number corresponding to the following meanings:

2: source	3: reloc
4: absolute	5: listing
6: emul_com	7: link_com
8: trace	9: prom
10: asmb_sym	11: sim_io
12: link_sym	

Additional types represent various system files. Also listed are the first and last pages of the file, the length of the file (in pages), and the directory sector listing the file. The next line indicates the error, and the page on which the error occurred. Table 3-7 contains a list of the soft fix error messages.

Errors	0
File entries deleted	0
Files	0
File pages	0
Recoverable pages	0
Free pages	0
Total free pages	0
Total pages	0

Checking active files, directory sector xxxx

CHECKING FREE LIST

NOTE

When the message "WARNING: FILE IS UNUSUALLY LARGE" appears this is not necessarily an error.

Display

You should verify the file is as large as listed. This message occurs for all files larger than 25 pages. Thus, the soft fix routine may be run without corrections when the disc is nearly full, and you wish to know if there are any large files which may be aborted after it finishes checking the active files.

When the soft fix routine is finished, the status line will read:

**Awaiting Selection**

and the softkey selections will return to the original Disc Utility softkeys.

Table 3-7. Soft Fix Error Messages

WARNING: FILE IS UNUSUALLY LARGE.

ILLEGAL FILE NAME

A file was found in the directory which an illegal name. The file will be deleted if corrections are being made

FIRST PAGE IS INVALID

The directory pointed to an invalid page. The file will be deleted if corrections are being made.

FIRST REVERSE LINK IS NOT -1

LAST FORWARD LINK IS NOT -1

THERE IS A FORWARD LINK ERROR

THERE IS A REVERSE LINK ERROR

THERE IS A FILE SIZE ERROR

FIRST PAGE IS ALREADY ALLOCATED

LAST PAGE IS ALREADY ALLOCATED

FORWARD LINK SHOULD NOT BE -1

REVERSE LINK SHOULD NOT BE -1

FORWARD LINK PAGE IS INVALID

LAST PAGE IS INVALID

LAST PAGE IS INVALID

ILLEGAL FORWARD LINK

The above indicate that an error was found with the specific file. Fix will attempt to fix the file but the file may be incorrect or truncated.

FREE PAGE IS ALREADY ALLOCATED

This is the free list error which only show up if corrections are not being made. Soft fix should probably be run with corrections.

## MAC Discs

### Diagnostic Selection Display

The first display in the MAC disc diagnostics is shown below. If this display did not appear at the end of the boot, retry the boot operation.

```

                                SYSTEM DISC UTILITY

WARNING: All other stations should be powered off. If soft fix is run
the printer (if any) should remain on.

Options:

format.....Format the disc

test.....Test the disc

fmt & tst.....Format the disc and test. Mark defective tracks.

soft fix.....fix file linkages

hard fix.....Read and write each disc sector (Not available for 7910)

STATUS: Awaiting
        selection_____14:18

format  test  fmt & tst  soft fix  hard fix  _____  end
```

### MAC Disc Test Selection Display

The five options listed on the display provide routines that read, write, and test all supported disc drives, except as noted below.

Format routine.....Performs 64000 system initialize on the disc.

Test routine.....Tests various disc capabilities.

Format & Test.....Formats, tests, and marks defective tracks.

Soft Fix.....Fixes file linkage errors.

Hard Fix.....Read/write each disc sector. (Model 7910H excluded)



Format **<format>**

This routine initializes the disc for use in the 64000 system. Format performs the quickest 64000 system initialization; however, because no testing is performed, its ability to detect marginal areas of the disc is limited. Whenever there is a question as to the reliability of the media, it is recommended that the Format and Test **<fmt&tst>** be run. This test requires a minimum of thirty minutes.

CAUTION

Formatting or initializing causes the loss of all information stored in disc memory. Back up all user files before continuing.

When Format is selected, the system executes a series of displays that require input of bus address numbers and unit numbers. When more than one disc controller is on the bus, the system requests entry of the address of the disc to be initialized. Similarly, when more than one unit is connected to a controller, the system requests entry of the unit number to be initialized.

When a 7906 disc is used, the system asks,

**WHICH PART DO YOU WANT TO DO OPERATIONS ON NOW?**

The options for selection are:

entire.....selects upper and lower disc as a single unit.

lower.....selects the lower disc.

upper.....selects the upper disc.

After the initial questions are answered, the screen presents **<yes>** and **<no>** softkeys and the question:

**Do You Want To Format?**

**<no>**

When **<no>** is selected, the display shows the Disc Initialization softkeys again. At this point no data has been lost. Press **<menu>** to return to the Disc Initialization Menu Display.

**<yes>**

When **<yes>** is selected, the formatting begins. As each cylinder is examined, the cylinder number is displayed in the upper right corner of the screen. At the end of the format, the number of defective tracks encountered is displayed above the message line. Tracks found to be defective during the format can not be subsequently used by the system. When a large number of tracks are found to be defective, the screen will display an "unable to format" message.

When 'invalid' (but not defective) tracks are found, the system attempts to recover them automatically.

The following messages appear, one after the other, on the message line:

Writing Directory

Building Free List

When **<format>** is used, the free list contains a listing of all tracks that are not marked defective. After the free list is built, the disc is completely initialized and the softkeys offer the Disc Initialization menu.

Test **<test>**

When **<test>** is selected, a series of tests are performed on the disc and its controller circuitry, and any errors are reported on the display. The following is an explanation of the tests and messages which appear.

Before the tests begin the system executes a series of displays that require input of bus address numbers and unit numbers. When more than one disc controller is on the bus, the system requests entry of the address of the disc controller to be tested. Similarly, when more than one unit representing a hard disc is connected to a controller, the system requests entry of the unit number to be tested.

When a 7906 disc is used, the system asks:

**WHICH PART DO YOU WANT TO DO OPERATIONS ON NOW?**

The options for selection are:

entire.....selects upper and lower disc as a single unit.  
lower.....selects the lower disc.

upper.....selects the upper disc.

After the initial questions are answered, the system asks:

**TEST TIME IN MINUTES**

The recommended test time is 30 minutes, in order to provide enough data samples for a valid statistical analysis. To begin, press the **<30mins>** softkey and then press **[RETURN]**. When the **<indef>** softkey is pressed, the test continues until the **<end test>** softkey is pressed. This allows thorough testing during periods when the system can be left running.

**Loop Back Test.** This test is run at the beginning of testing. The development station writes data to a hardware buffer, in the disc controller, and reads it back without writing to the disc. When the message "LOOP BACK TEST FAILED" occurs, a communication problem may exist between the development station and the disc.

**Megabytes Verified.** One half megabyte increments of data beginning at cylinder zero are verified. The integer value after Megabytes Verified indicates the number of megabytes verified. Data is read and CRC (cycle redundancy check) verified for all sectors, and all heads. A failure of the CRC to verify is logged as a "DISC ERROR" on the display. The cylinder, head, and number of times a data error is found on this track appears to the right of the display. Normally this portion of the display is blank.

The CRC circuitry is physically in the 13037 Controller, for a MAC Disc. A MAC disc is composed of one to eight discs (7906, 7920, 7925, or a combination), a 13037C Controller and a 12745A interface board. Hence, a "DISC ERROR" failure could indicate a failure in the Disc Drive, Disc Controller, or connections between them. The following descriptions indicate the type of information you may want to have ready if you need to call a service representative:

Erratic DISC ERRORS, (i.e., an inconsistent pattern of cylinders reporting Data Errors) is more likely to be a problem in circuitry or connections rather than a problem on the disc media. The Controller ECC board should be checked as well as other Controller and disc circuitry. If other than a MAC disc (i.e., a 7910), run the self test.

NOTE

When errors seem to be heat sensitive refer to Disc Controller problems.

Data errors reported consecutively for every cylinder beginning at 0 for a particular head, points to a bad head. Otherwise, the problem may be the Read/Write Preamp or I/O Control Board in the disc drive.

Data errors appearing repetitively for certain tracks is an indication that the disc media may be defective for those tracks. For some reason these tracks were not marked defective when the disc was originally formatted on the 64000 system. Tracks on which data errors are repetitively found may be marked defective and excluded from the FREE LIST by formatting; thus, keeping the system software from ever accessing them. Before marking the tracks defective run hard fix (MAC discs only) because it may correct the problem.

NOTE

The 64000 System does not use 'sparing' in the disc memory.

NOTE

The testing phase can locate more than 10 tracks which give data errors. This number of defective tracks indicates that something major is wrong with either the disc media, or disc alignment, or disc circuitry.

Megabytes of I/O. This test checks out the entire I/O link from the 64000 Master controller station to/from the actual disc storage media. A unique bit pattern is written (once every two timed seeks) to an unused track on the disc. (Typically this is track 410 but always is the highest number track on the disc) This bit pattern is read back four times, each time it is checked against a stored buffer of the transmitted information. When all four reads of a pattern are bad, a transmit error is logged; when three, two or one reads are bad, a receive error is logged. It is possible that data was written correctly on the disc, but was transmitted incorrectly by the disc four times; it is also possible that the 64000 incorrectly received the data four times. Therefore, an

error reported as a transmit error could be a receive error, however, an error reported as a receive error could only be a receive error. Now check for disc errors.

When disc errors are also occurring, there is a problem between the disc controller and disc storage media. Refer to Megabytes Verified for troubleshooting hints.

When no Disc Errors are reported, the problem is likely to be one of the following:

- a. Noisy environment. Check that the entire 64000 system is on one circuit breaker and that no heavy machinery is also sharing the line. The system bus cable may also be picking up radio frequency interference.
- b. The 64000 station mainframe PV, system bus test, does not completely check the output of the HP-IB PHI chip on the I/O board and the HP-IB transceivers or the rear panel board. These may cause I/O errors to be logged.
- c. System Bus Cable may be damaged. Try replacing with another cable.
- d. Disc Controller problems. When testing a MAC disc, check the HP-IB interface board, 12745A, and if the problem seems to be heat sensitive suspect the ECC board first. Check that both Controller fans are operating at full speed, by powering down the controller and watching the spin-down time of the fan. It should exceed 15 seconds. Run Self Test on other than the MAC disc.

**Timed Seek.** After every 1/2 megabytes verified, a seek is performed to the inner track where the I/O writes and reads are performed. Each direction of travel to and from the track increments the timed seeks counter by one. As the area of the disc where verification is being performed gets nearer the highest track number, the seeks become consecutively shorter. In this manner, an entire range of seeks is performed for a thorough testing.

A failure to complete a seek within the required time limit causes the display to log a seek error. If failures occur, refer to the Disc Service Manual for checking and adjusting the seek time.

**Test Summary** During the testing, errors are logged on the right half of the display. Any tracks found to be in error are not excluded from the free list when a subsequent Format is performed.

## Format and Test **<fmt&tst>**

The system allows you to select the Format or Test phases of disc initialization independently. The Format and Test mode allows the formatting and testing to be conducted together. (Especially useful in bringing up a new system.)

### CAUTION

Formatting or initializing causes the loss of all information stored in disc memory. Back up all user files before continuing.

When chosen, the disc is formatted, tested and then the free list and directory are written. The free list contains a list of all tracks except those found to be defective during the Format and tracks that failed two or more times during the Test. Because **<fmt&tst>** builds a more reliable and complete free list, this mode of initializing a disc is recommended over use of the separate **<format>** when disc media is suspect.

Before beginning the routine, the system executes a series of displays that require input of bus address numbers and unit numbers. When more than one disc controller is on the bus, the system requests entry of the address of the disc controller to be tested. Similarly, when more than one unit representing a hard disc is connected to a controller, the system requests entry of the unit number to be tested.

When a 7906 disc is used, the system asks:

**WHICH PART DO YOU WANT TO DO OPERATIONS ON NOW?**

The options for selection are:

entire.....selects upper and lower disc as a single unit.

lower.....selects the lower disc.

upper.....selects the upper disc.

After the address and unit questions are answered, the system asks:

**TEST TIME IN MINUTES**

The recommended test time is 30 minutes, to obtain enough data samples for a valid statistical analysis. To begin, press the **<30\_mins>** softkey and then press **[RETURN]**. When the **<indef>** softkey is pressed, the test continues until the **<end\_test>** softkey is pressed. This allows thorough testing during periods when the system can be left running.

After the initial questions are answered, the screen presents **<yes>** and **<no>** softkeys and the question:

**Do You Want To Format?**

<no>

When **<no>** is selected, the display shows the Disc Initialization softkeys again. At this point no data loss will have occurred. Press **<menu>** to return to the Disc Initialization Menu Display.

<yes>

When **<yes>** is selected, the formatting begins. As each cylinder is examined, the cylinder number is displayed in the upper right corner of the screen. At the end of the format, the number of defective tracks encountered is displayed above the message line. Tracks found to be defective during the format can not be subsequently used by the system.

When 'invalid' (but not defective) tracks are found, the system attempts to recover then automatically.

At the end of the format operations, the testing phase begins. Each test is described below.

**Loop Back Test.** This test is run at the beginning of testing. The development station writes data to a hardware buffer, in the disc controller, and reads it back without writing to the disc. Then the message "LOOP BACK TEST FAILED" occurs, a communication problem may exist between the development station and the disc.

**Megabytes Verified.** One half megabyte increments of data beginning at cylinder zero are verified. The integer value after Megabytes Verified indicates the number of megabytes verified. Data is read and CRC (cycle redundancy check) verified for all sectors, and all heads. A failure of the CRC to verify is logged as a DISC ERROR on the display. The cylinder, head, and number of times a data error is found on this track appears to the right of the display. Normally this portion of the display is blank.

The CRC circuitry is physically in the 13037 Controller, for a MAC disc. A MAC disc is composed of one to eight discs (7906, 7920, 7925, or a combination), a 13037C Controller and a 12745A interface board. Hence, a DISC ERROR failure should be troubleshot in the Disc Drive, Disc Controller, or connections between them. Here are some suggestions.

**Erratic DISC ERRORS,** (i.e., an inconsistent pattern of cylinders reporting Data Errors) is more likely to be a problem in circuitry or connections rather than a problem on the disc media. The Controller ECC board should be checked as well as other Controller and disc circuitry. If other than a MAC disc (i.e. a 7910), run the self test. Refer to Disc Service Manuals.

NOTE

When errors seem to be heat sensitive. Refer to Disc Controller problems.

Data errors reported consecutively for every cylinder beginning at 0 for a particular head, points to a bad head. Otherwise, the problem may be the Read/Write Preamp or I/O Control Board in the disc drive.

Data errors appearing repetitively for certain tracks is an indication that the disc media may be defective for those tracks. For some reason these tracks were not marked defective when the disc was originally formatted on the 64000 system. Tracks on which data errors are repetitively found may be marked defective and excluded from the FREE LIST by formatting; thus, keeping the system software from ever accessing them. Prior to marking the tracks defective, hard fix should be run (MAC disc only) because it may correct the problem.

NOTE

The 64000 System does not use 'sparing' in the disc memory.

NOTE

The testing phase can locate more than 10 tracks which give data errors. This number of defective tracks indicates that something major is wrong with either the disc media, or disc alignment, or disc circuitry.

Megabytes of I/O. This test checks out the entire I/O link from the 64000 Master Controller station to/from the actual disc storage media. A unique bit pattern is written (once every two timed seeks) to an unused track on the disc. (typically this is track 410 but always is the highest numbered track in the free list). This bit pattern is read back four times, each time checking it against a stored buffer of the transmitted information.

When all four reads of a pattern are bad, a transmit error is logged; when three, two or one reads are bad, a receive error is logged. It is possible that data was written correctly on the disc, but was transmitted incorrectly by the disc four times; it is also possible that the 64000 incorrectly received the data four times. Therefore, an error reported as a transmit error could be a receive error, however, an error reported as a received error could only be a receive error. Now check for DISC ERRORS.

When DISC ERRORS are also occurring, there is a problem between the disc controller and disc storage media. Refer to Megabytes Verified for troubleshooting hints.



When no DISC ERRORS are reported, the problem is likely to be one of the following:

- a. Noisy environment. Check that the entire 64000 system is on one circuit breaker and that no heavy machinery is also sharing the line. The system bus cable may also be picking up radio frequency interference.
- b. The 64000 mainframe PV, system bus test, does not completely check the output of the HP-IB PHI chip on the I/O board and the HP-IB transceivers or the rear panel board. These may cause I/O errors to be logged.
- c. System Bus Cable may be damaged. Try replacing with another cable.
- d. Disc Controller problems. When testing a MAC disc, check the HP-IB interface board, 12745A, and if the problem seems to be heat sensitive suspect the ECC board first. Check that both Controller fans are operating at full speed, by powering down the controller and watching the spin-down time of the fan. It should exceed 15 seconds. Run Self Test on other than MAC disc.

**Timed Seek.** After every 1/2 megabytes verified, a seek is performed to the inner track where the I/O writes and reads are performed. Each direction of travel to and from the track increments the timed seeks counter by one. As the area of the disc where verification is being performed gets nearer the highest track number, the seeks become consecutively shorter. In this manner, an entire range of seeks is performed for a thorough testing.

A failure to complete a seek within the required time limit causes the display to log a seek error. If failures occur, refer to the Disc Service Manual for checking and adjusting the seek time.

**Test Summary.** During the testing, errors are logged on the right half of the display. After testing is through, the free list and directory are written. The free list contains a list of all tracks except those found to be defective during the Format, and tracks that failed two or more times during the Test.

Soft Fix **<soft\_fix>**

The soft fix routine repairs incorrect file linkages. It should be used when errors such as disc full occur when the disc is not full. Press **<soft\_fix>** softkey. Soft Fix error messages are listed in Table 3-8.

Select a disc # to be examined, and press **[RETURN]**. The command line displays:

```
Make corrections?  
<no>          <yes>
```

<no>

When you select **<no>**, the errors are listed, and no corrections are made. In this case the **<abort>** softkey allows exit.

<yes>

When you select **<yes>**, the errors are corrected. The **<abort>** softkey is not available, and the program must not be halted under any circumstances.

When the printer is on during the soft fix routines, a list of errors is printed out. Active files, recoverable files, and finally free pages are checked. These three categories appear in the listing.

Along with the file name and error, the file type is indicated by a number corresponding to the following meanings:

2: source	3: reloc
4: absolute	5: listing
6: emul_com	7: link_com
8: trace	9: prom
10: asmb_sym	11: sim_io
12: link_sym	

Additional types represent various system files. Also listed are the first and last pages of the file, the length of the file (in pages), and the directory sector listing the file. The next line indicates the error, and the page on which the error occurred.

NOTE

When the message "WARNING: FILE IS UNUSUALLY LARGE" appears this is not necessarily an error.

You should verify the file is as large as listed. This message occurs for all files larger than 25 pages. Thus, the soft fix routine may be run without corrections when the disc is nearly full, and the user wishes to know if there

are any large files which may be purged. In this case, the soft fix routine may be aborted after it finishes checking the active files.

After the errors are listed to the printer, the status is displayed. At this point the Disc Utility menu reappears.

Table 3-8. Soft Fix Error Messages

WARNING: FILE IS UNUSUALLY LARGE.

ILLEGAL FILE NAME

A file was found in the directory with an illegal name. The file will be deleted if corrections are being made.

FIRST PAGE IS INVALID

The directory pointed to an invalid page. The file will be deleted if corrections are being made.

FIRST REVERSE LINK IS NOT -1

LAST FORWARD LINK IS NOT -1

THERE IS A FORWARD LINK ERROR

THERE IS A REVERSE LINK ERROR

THERE IS A FILE SIZE ERROR

FIRST PAGE IS ALREADY ALLOCATED

LAST PAGE IS ALREADY ALLOCATED

FORWARD LINK SHOULD NOT BE -1

REVERSE LINK SHOULD NOT BE -1

FORWARD LINK PAGE IS INVALID

LAST PAGE IS INVALID

ILLEGAL FORWARD LINK

The above indicate that an error was found with the specific file. Fix will attempt to fix the file but the file may be incorrect or truncated.

FREE PAGE IS ALREADY ALLOCATED

This is the free list error which only shows up if corrections are not being made. Soft fix should probably be run with corrections.

Hard Fix **<hard fix>**

The hard fix routine reads each sector of disc and writes it back. It should be used for correcting hard data errors. These can be indicated by a large number of errors when reading or writing to the disc, or by the inability to use the display, as indicated by the message:

**FILE NOT FOUND. FILE display:HP** (for example)

Hard fix should be used when errors occurred in the test mode, as it may correct them. If **<fmt&tst>** was used and allowed to complete, Hard Fix will not correct the errors since the tracks have been marked defective. The hard fix capability is for the MAC discs only. When the **<hard fix>** softkey is pressed, the system displays the message:

**# of disc to be examined?**

Make a selection and press **[RETURN]**. The status line indicates:

**STATUS fixing cylinder 0**

During hard fix when any errors are found on the disc, the message "Retrying Disc N" is displayed. This is a normal message. At the completion of the hard fix routine, the status line indicates "Awaiting Selection", and the Disc Utility menu reappears.